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A revision of the Japanese species of the genus *Anarsia* Zeller (Lepidoptera, Gelechiidae)

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Abstract Japanese species of the genus *Anarsia* are revised. The monophyly of the genus is supported by 3 synapomorphies. Seven species are dealt with : 2 species, *A. incerta* and *A. silvosa*, are described as new to science ; *A. tortuosa* (Meyrick), comb. n. is transferred from *Chelaria*. *A. protensa*, *A. bimaculata* and *A. tortuosa* are recorded from Japan for the first time. The true female of *A. protensa* is described. Adults, wing venations and genitalia of both sexes are illustrated.

Key words Gelechiidae, *Anarsia*, new species, new combination, Japan.

Introduction

The gelechiid genus *Anarsia* Zeller, 1839 is comprised of about 100 described species in the world. It includes a well-known pest of stony fruits of Rosaceae such as *A. lineatella* Zeller, 1839 (Ponomarenko, 1989). The species of *Anarsia* can be easily recognized by the vestigial 3rd segment of the male labial palpus. However, in the female it is fully developed and the appearance is similar to the species of the genus *Hypatima* Hübner, 1825. Consequently, some species of the genus were described in the genus *Hypatima* on the basis of the female specimens.

Recently, Ponomarenko (1989), Park (1991, 1995) and Réal (1994) revised the genus *Anarsia* from Russia, Korea and Taiwan, and France, respectively. Up to date, only 2 species, *viz. A. bipinnata* (Meyrick, 1932) and *A. isogona* Meyrick, 1913 have been known to occur in Japan. In this paper, I revise the Japanese species of *Anarsia* with brief discussion on the monophyly of the genus and the species grouping.

Holotypes are preserved in the collection of Entomological Laboratory, Osaka Prefecture University. The following abbreviations are used for collections :

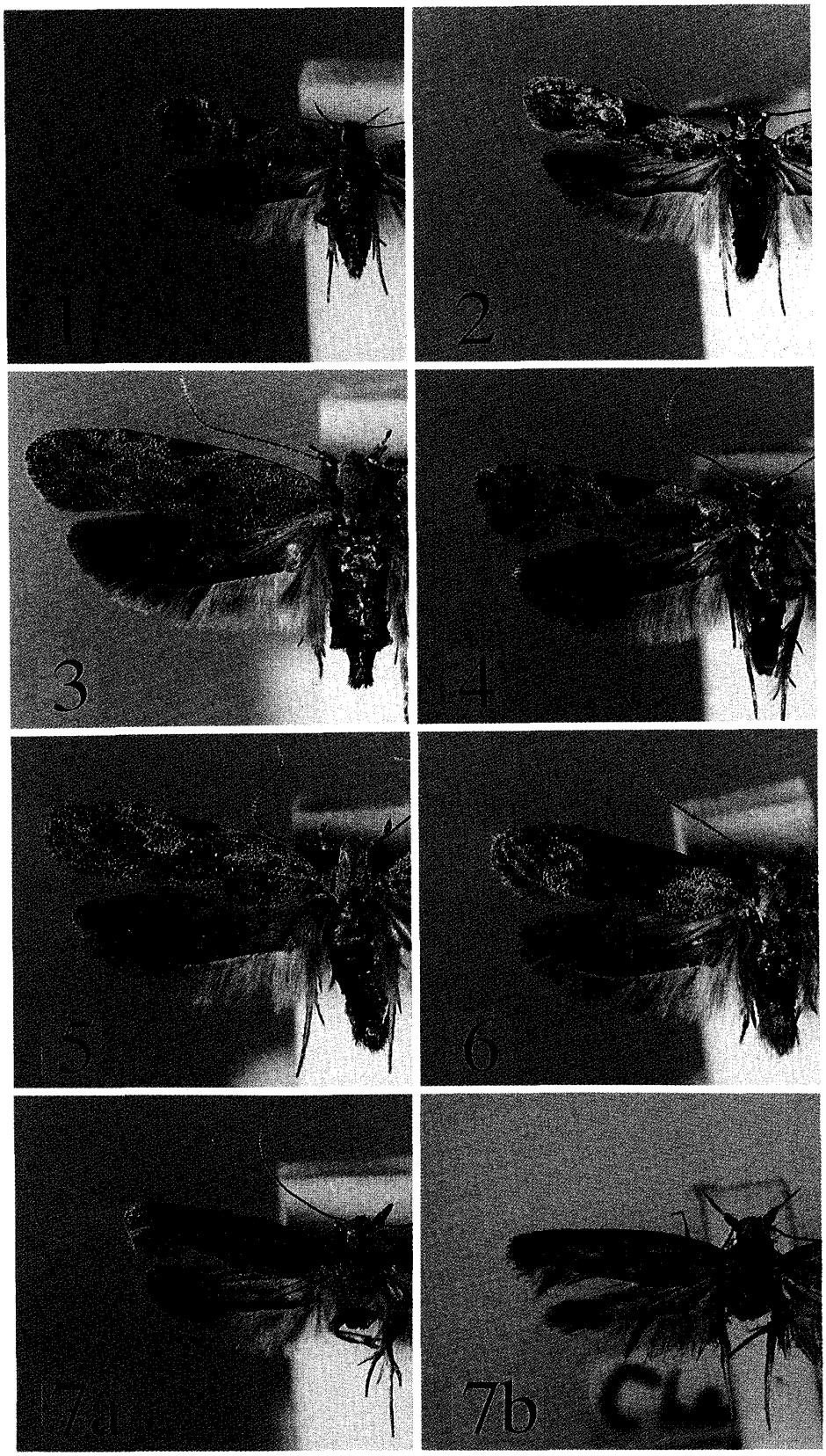
HU : Laboratory of Systematic Entomology, Hokkaido University, Sapporo.
OMNH : Osaka Museum of Natural History, Osaka.
OPU : Entomological Laboratory, Osaka Prefecture University, Sakai.

The terminology of the male and female genitalia were referred to Klots (1970).

Anarsia Zeller, 1839

Anarsia Zeller, 1839, *Isis, Leipzig* **1839** : 190. Type species : *Tinea spartiella* Schrank, 1802, *Fauna Boica* **2**(2) : 104, by subsequent designation by Meyrick, 1925, *in* Wytsman, *Genera Insect.* **184** : 153.
Ananarsia Amsel, 1959, *Stuttg. Beitr. Naturk.* **28** : 32. Type species : *Anarsia lineatella* Zeller, 1839, *Isis, Leipzig* **1839** : 190, by original designation.

Head with appressed scales. Proboscis developed, basal 2/3 squamose. Antenna about 2/3 length of forewing ; scape without pecten. Labial palpus with 3 segments ; 1st short, 2nd



Figs 1–7. Adults of *Anarsia* spp. 1. *A. isogona* Meyrick, ♀. 2. *A. incerta* sp. n., ♂, holotype. 3. *A. bipinnata* (Meyrick), ♀. 4. *A. protensa* Park, ♂. 5. *A. bimaculata* Ponomarenko, ♀. 6. *A. silvosa* sp. n., ♂, holotype. 7a. *A. tortuosa* (Meyrick), ♂. 7b. *A. tortuosa* (Meyrick), ♀, holotype.

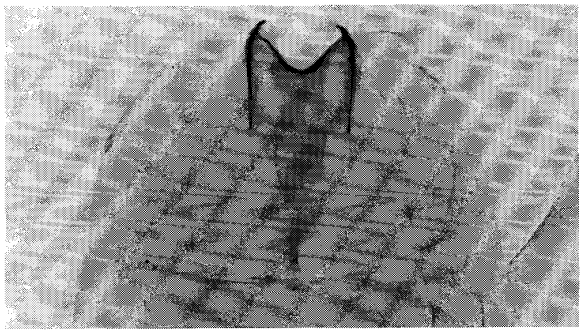


Fig. 8. Second abdominal sternite of *Anarsia bimaculata* Ponomarenko.

beneath densely clothed with scales forming subtriangular or subtrapezoidal tuft, 3rd in male vestigial, usually concealed, in female moderate, acute. Thorax with or without hair pencil, arising from mesothoracic anepisternum in male. Forewing with or without long hair pencils at ventral base of cell on undersurface in male ; pterostigma well developed from base to R_1 ; 12 veins ; R_4 and R_5 stalked, R_5 to costa, sometimes M_1 and R_{4+5} stalked, CuA_1 and CuA_2 parallel. Hindwing with almost straight costal margin or more or less expanded costal margin from base to beyond middle ; 8 veins ; R_1 present, Rs and M_1 stalked.

Pregenital abdomen. Second sternite with distinctive pair of sternal apodemes and venulae ; venulae straight or sinuate ; anterior margin concave, sclerotized ; central area well sclerotized, sagittate-shaped, tapered from anterior to posterior margin (Fig. 8). Eighth sternite with concave posterior margin in male.

Male genitalia. Asymmetrical. Uncus variable in shape with a digitate or triangular apical process. Socius expanded posterolaterally into large semicircular lobes or absent ; Gnathos absent. Tegumen long, usually tapered posteriorly. Vinculum with inflated dorsal region which is connected with tegumen. Valva asymmetrical, variable in shape ; terminal portion with numerous modified scales ; left valva with or without a long, sclerotized process on ventral margin. Saccus present or absent. Aedeagus slender, without cornutus.

Female genitalia. Papilla analis of normal gelechiid structure, sub-ovate, set with sensory setae ; apophysis posterioris rod-like. Eighth tergite evenly sclerotized ; inner surface armed with variable shaped sclerites or sclerotized portions. Eighth sternite with or without a large pouch on anterior margin. Antrum present or absent. Ductus seminalis arising from anterior portion of corpus bursae or from middle of ductus bursae. Signum present or absent.

Remarks. The genus *Anarsia* is externally similar to the genera *Hypatima* Hübner, 1825 and *Faristenia* Ponomarenko, 1991, however, *Anarsia* can be separated from them by the vestigial 3rd segment of the male labial palpus.

The monophyly of the genus is supported by the following synapomorphies :

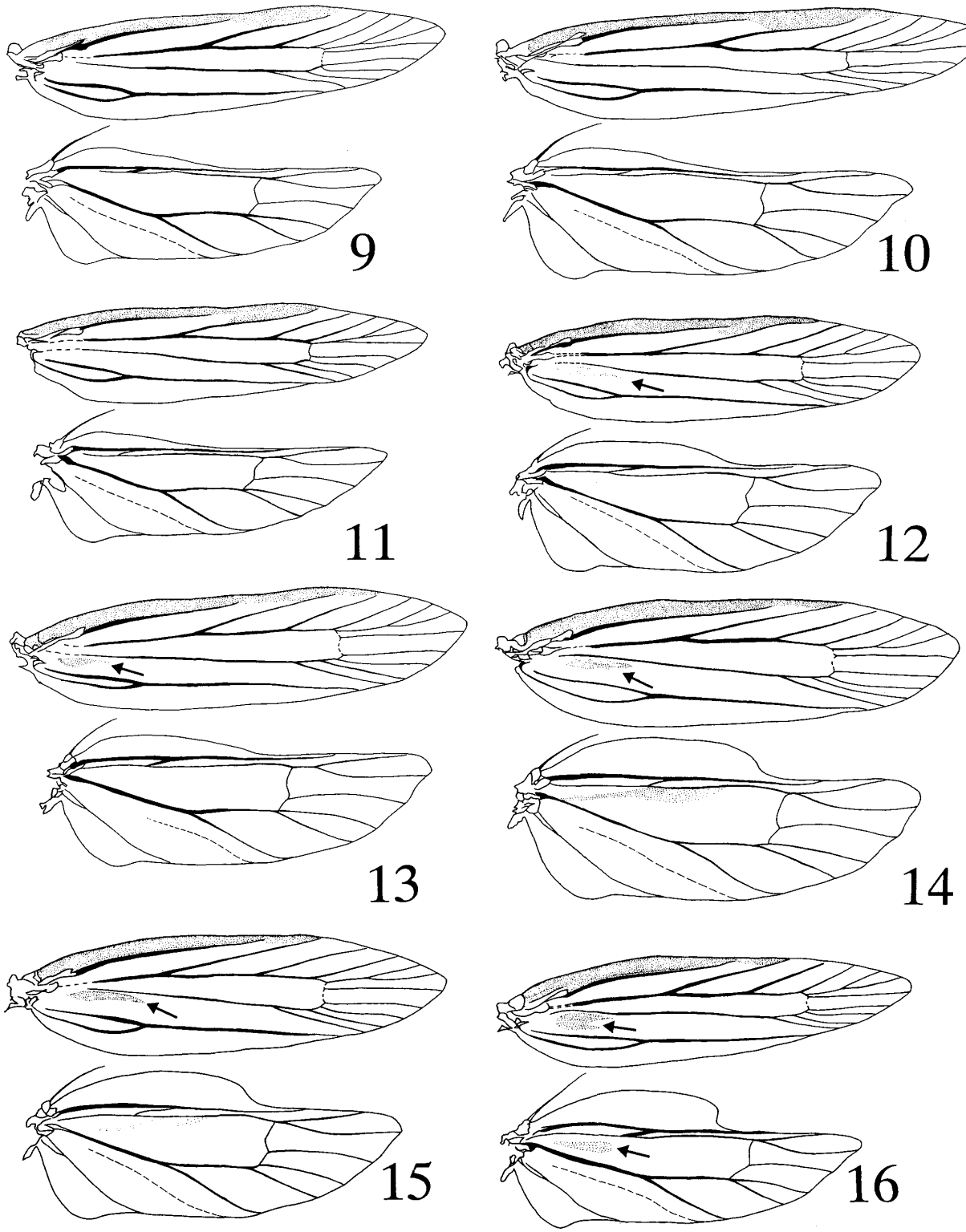
1) Vestigial 3rd segment of the labial palpus in the male. Although this unique character invariably present throughout the genus *Anarsia*, this trait does not constitute an indisputable synapomorphy as it is paralleled in some *Hypatima* species.
2) Lack of the gnathos in the male genitalia. A hooked gnathos is considered a ground-plan character of the Gelechiidae (Pitkin and Sattler, 1991) and the lack of gnathos is here considered a synapomorphy of the genus.

Table 1. List of the classifications of the subgenera or species groups within *Anarsia* proposed by the senior authors and the tentative arrangement in this paper.

Ponomarenko, 1989	Réal, 1994	Park, 1995	Present treatment
subgenus *Anarsia*	Group 1	*spartiella* group	Group A
spartiella (Schrank)	*belutschistanella* (Amsel)	*euphorodes* Meyrick	*isogona* Meyrick
halimodendri Christoph	Group 2	*aspera* Park	*incerta* sp. n.
eburnella Christoph	*bipinnata* (Meyrick)	*protensa* Park	
bimaculata Ponomarenko	Group 3		Group B
	eleagnella Kuznetsov		*bipinnata* (Meyrick)
subgenus *Ananarsia*	*acaciae* Walsingham	*lineatella* group	*protensa* Park
lineatella Zeller	*arachniota* Meyrick	*patulella* (Walker)	
eleagnella Kuznetsov	Group 4	*tricornis* Meyrick	Group C
arachniota Meyrick	*aleurodes* Meyrick	*isogona* Meyrick	*bimaculata* Ponomarenko
belutschistanella (Amsel)	Group 5	*choana* Park	*silvosa* sp. n.
	lineatella Zeller	*elongata* Park	
	Group 6		Group D
	tortuosella Amsel		*tortuosa* (Meyrick), comb. n.
	Group 7		
	retamella Chrétien		
	Group 8		
	geminella Amsel		
	Group 9		
	halimodendri Christoph		
	bimaculata Ponomarenko		
	Group 10		
	eburnella Christoph		
	nuristanella Amsel		

3) Presence of the modified scales on the inner surface of the valva in the male genitalia. This specialization occurs uniquely within the Gelechiidae.

As shown in Table 1, the genus *Anarsia* is subdivided into 2 subgenera or some species groups by the senior authors. Ponomarenko (1989) recognized the subgenera *Anarsia* and *Ananarsia* in the genus on the basis of the forewing pattern and the male and female genitalia. Réal (1994) divided the genus into 10 species groups mainly based on the male genitalia. The classifications of Ponomarenko (1989) and Réal (1994) are based on the genitalic characters of the Palaearctic *Anarsia* species for subdividing the genus. The classification of Réal is more fractionalized than that of Ponomarenko. On the other hand, Park (1995) divided Taiwanese *Anarsia* into 2 species groups based on the presence of the hair pencils on the male forewing undersurface. In this paper, I propose a tentative arrangement for the Japanese *Anarsia* species on the basis of inferred synapomorphies (Table 1). The group A which is partly congruent with the *lineatella* group of Park (1995) includes 2 species, *viz. A. isogona* Meyrick and *A. incerta* sp. n. The group A is characterized by a synapomorphy: thorn-like coecum of the male genitalia which is curved posteroventrally. The group B consists of 2 species, *viz. A. protensa* Park and *A. bipinnata* (Meyrick), and characterized by a synapomorphy: the presence of the hair pencils on the male mesothoracic anepisternum. Réal (1994) assigned *A. bipinnata* (Meyrick) to his group 2 based on the figures of the genitalia in Amsel (1967) and Kuznetzov & Stekolnikov (1984). However, the figure of the male genitalia shown by Kuznetzov & Stekolnikov (1984) is misidentified one, and the definition of the group 2 remains more or less unclear. The group C consists of 2 species, *viz. A. bimaculata* Ponomarenko and *A. silvosa* sp. n., and characterized by the following synapomorphies: the large oval left valva; the long curved process of the left



Figs 9–16. Wing venations of *Anarsia* spp. 9–10. *A. isogona* Meyrick, ♂. 11. *A. incerta* sp. n., ♂, paratype. 12. *A. bipinnata* (Meyrick), ♂. 13. *A. protensa* Park, ♂. 14. *A. bimaculata* Ponomarenko, ♂. 15. *A. silvosa* sp. n., ♂, paratype. 16. *A. tortuosa* (Meyrick), ♂. Arrows indicate sockets of the hair pencils.

valva; the anteriorly curved process of the right valva. This group is congruent with the subgenus *Anarsia* of Ponomarenko (1989) and with the group 9 of Réal (1994). The group D consists of only 1 species, *viz. A. tortuosa* (Meyrick), comb. n., and characterized by an autapomorphy: the presence of the hair pencils on the male hindwing. In groups A and B, the large semicircular socius are present in the male genitalia. On the other hand, in groups B, C and D, the hair pencils are present in the male forewing undersurface. At this moment, I can not decide which character is a true synapomorphy because of insufficiency of other synapomorphies for constructing the cladogram of the Japanese *Anarsia* species groups.

Key to Japanese species of *Anarsia*

External characters

1. Forewing brownish ····· *tortuosa* (Meyrick)
— Forewing grayish ····· 2
2. Forewing with a roughly projected blotch of blackish scales at middle ····· *silvosa* sp. n.
— Forewing without such a blotch ····· 3
3. Forewing with 2 distinct marks at about middle, one on costa and the other on cell ····· 4
— Forewing with a large distinct mark on costa at about middle ····· 5
4. Forewing with a blackish streak on fold ····· *bimaculata* Ponomarenko
— Forewing without such a streak ····· *bipinnata* (Meyrick)
5. Thorax with whitish suffusion on each lateral side ····· *incerta* sp. n.
— Thorax without such suffusion ····· 6
6. Cilia of the forewing with grayish median and terminal shades; fore tarsus with a whitish apical ring on each segment ····· *protensa* Park
— Cilia of the forewing without shade; fore tarsus without whitish apical ring on each segment ····· *isogona* Meyrick

Male genitalia

1. Left valva with a process on ventral margin ····· 2
— Left valva without process on ventral margin ····· 5
2. Right valva with a long, slender sclerotized process ····· 3
— Right valva without such a process ····· 4
3. Aedeagus almost straight, with a semicircular keel at ventral base ··· *silvosa* sp. n.
— Aedeagus with apical 1/6 curved, with a small keel at ventral base ····· *bimaculata* Ponomarenko
4. Valva with basal 3/5 broad, abruptly tapered to narrow distal 2/5 ····· *isogona* Meyrick
— Valva of even width, not abruptly tapered distally ····· *incerta* sp. n.
5. Left valva with a hook-shaped process on inner surface ····· *tortuosa* (Meyrick)
— Left valva without such a process ····· 6
6. Left valva with a triangular lobe on inner surface ····· *bipinnata* (Meyrick)
— Left valva without such a lobe ····· *protensa* Park

Female genitalia

1. Eighth sternite with a membranous pouch on anterior margin ····· 2
— Eighth sternite without such a pouch ····· 4

2. Apophysis anterioris present 3
— Apophysis anterioris absent ..... *tortuosa* (Meyrick)
3. Signum present ..... *incerta* sp. n.
— Signum absent ..... *isogona* Meyrick
4. Antrum large, funnel-shaped 5
— Antrum small 6
5. Eighth sternite with a long rod-like process ..... *bipinnata* (Meyrick)
— Eighth sternite with no process ..... *protensa* Park
6. Signum present ..... *silvosa* sp. n.
— Signum absent ..... *bimaculata* Ponomarenko

Group A

Anarsia isogona Meyrick (Figs 1, 9, 10, 17)

Anarsia isogona Meyrick, 1913, *J. Bombay nat. Hist. Soc.* **22**: 169; Meyrick, 1925, *in* Wytsman, *Genera Insect.* **184**: 153; Caradja & Meyrick, 1935, *Microlepid. Kiangsu*: 69; Gaede, 1937, *in* Bryk, *Lepid. Cat.* **79**: 402; Clarke, 1969, *Cat. Type Specimens Microlepid. Br. Mus. nat. Hist. descr. E. Meyrick* **6**: 245, pl. 124, fig. 4; Park, 1995, *Trop. Lepid.* **6**: 60, figs 16–20, 44.
Anarsia protensa: Park, 1995, *Trop. Lepid.* **6**: 60, fig. 15, partim.

Forewing length: ♂, 4.2–5.6 mm (4.58±0.35 mm on mean±S.D. of 12 specimens); ♀, 4.5–5.7 mm (4.95±0.37 mm on mean±S.D. of 10 specimens).

Head pale brownish gray irrorated with white. Antenna pale brownish gray, with fuscous annulations; scape pale brownish gray, scattered with fuscous. Labial palpus with a dense subtriangular scale tuft on under surface of 2nd segment; 2nd segment blackish, apical 1/4 whitish gray irrorated with pale fuscous; 3rd segment about as long as 2nd, whitish gray with 4 very oblique blackish rings, 1st ring at base, 2nd broad, at middle, 3rd at 3/4 and 4th encompassing apex in female. Thorax pale brownish gray irrorated with white; tegula pale brownish gray irrorated with white, extreme base blackish. Legs blackish; fore tarsus scattered with white scales; mid tibia suffused dorsally with whitish scales on about basal half; mid tarsus with whitish apical ring on each segment; hind tibia suffused dorsally with whitish hairs; hind tarsus black suffused dorsally with whitish scales, with whitish apical ring; apical 4 segments black, with whitish apical ring. Forewing elongate; R_{4+5} and M_1 approximate, connate or stalked; ground color pale brownish gray, mixed with whitish, irregularly suffused with pale fuscous; costa with a blackish dot at base; costa with 2 small blackish marks before and beyond basal 2/5; a large subtriangular blackish mark occupying median 1/4 of costa and reaching beyond middle; 2 small blackish marks on costa beyond median subtriangular blackish mark; 2 obscure fuscous suffusions at apical 3/10 and 1/5; several obscure blackish dots round apical 1/5 of costa and along termen; cilia pale brownish gray, mixed with whitish and blackish. Hindwing pale brownish gray, hyaline on basal half; veins darker than ground color; cilia pale brownish gray. Abdomen pale brownish gray above, whitish beneath; anal tuft pale ocherous in male.

Male genitalia. Eighth sternite with posterior margin slightly concave at middle. Uncus of a narrow, acute process. Socius expanded posterolaterally into a large semicircular lobe. Tegumen about as long as valva, necked at 1/5. Valva asymmetrical; left valva with basal 3/5 broad, abruptly tapered to narrow distal 2/5; ventral margin with a slender, evenly curved process at 1/4; distal 2/5 bearing numerous modified scales with long stalk; right

valva rather slender than left valva, without hook-shaped process on ventral margin. Juxta with short lobe with minute setae. Aedeagus slender; coecum thorn-like, curved postero-ventrally.

Female genitalia. Apophysis posterioris about 3 times length of apophysis anterioris. Eighth tergite with a triangular sclerite at middle on ventral surface. Eighth sternite with anterior margin produced anteriorly into a large membranous pouch with funnel-like bursa. Ostium opening posteriorly beyond middle; lamella postvaginalis crescent-shaped, lamella antevaginalis produced posteriorly into semicircular to trapezoidal plate. Antrum funnel-shaped. Ductus seminalis arising from junction of short ductus bursae and corpus bursae. Signum absent.

Material examined. HONSHU: 1 ♂, Totsukawa, Nara Pref., 25. V. 1979, K. Yasuda, OPU; 1 ♀, Mt Makiosan, Osaka Pref., 19. VI. 1981, T. Sato, OPU; 4 ♂ 8 ♀, Toshi I., Mie Pref., 7. VIII. 1995, T. Ueda, OPU. KYUSHU: 1 ♀, Kawaura, Kumamoto Pref., 15–16. V. 1994, Y. S. Bae, OPU; 4 ♂, Mt Shibisan, Kagoshima Pref., 29–30. VII. 1995, T. Ueda, OPU; 1 ♂, Kurio, Kagoshima Pref., 20. VII. 1974, K. Yasuda, OPU.

Distribution. Japan (Honshu, Kyushu), China, Taiwan, India.

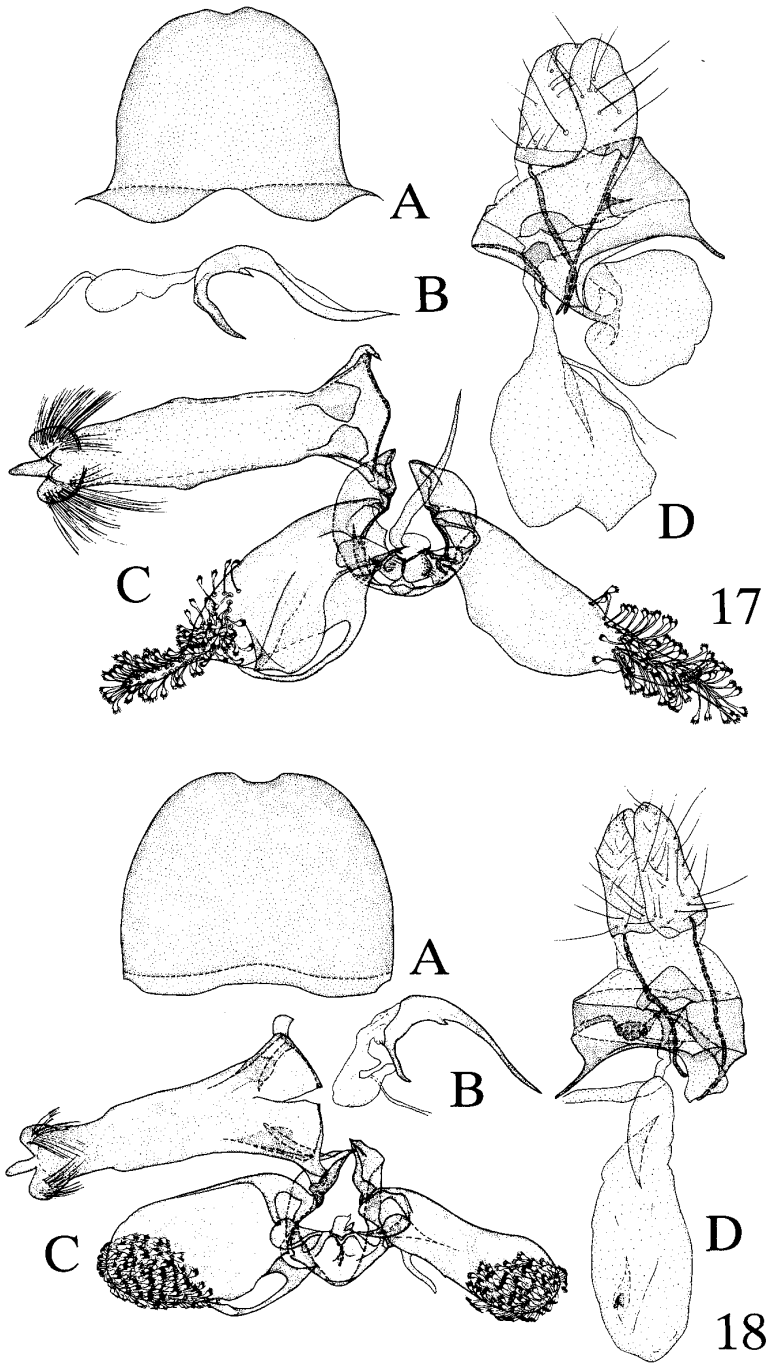
Biology. Meyrick (1939) recorded that the larva of *A. isogona* feeds on the leaves of *Schima* (Theaceae) from Java. In Japan, the host plant and the early stages are unknown.

Remarks. *A. isogona* is closest to *A. incerta* sp. n. and the distinguishing characters between them are mentioned under *incerta* sp. n. Intraspecific variations are found in the following characters: the origination of the M_1 of the forewing; in the female genitalia the shape of lamella antevaginalis, the size of the membranous pouch of the 8th sternite and the shape of the triangular sclerite on the ventral surface of 8th tergite. This species was recently added to the fauna of Japan (Park, 1995).

***Anarsia incerta* sp. n.** (Figs 2, 11, 18)

Forewing length: ♂, 4.7–5.7 mm (5.29±0.24 mm on average±S.D. of 34 specimens); ♀, 4.7–6.6 mm (5.86±0.43 mm on average±S.D. of 30 specimens).

Head whitish irrorated with pale brownish gray. Antenna pale brownish gray mixed with whitish, with fuscous annulations; scape whitish, scattered with pale brownish gray and blackish scales. Labial palpus with dense subtrapezoidal scale tuft on under surface of 2nd segment; 2nd segment blackish, apical 1/4 whitish irrorated with pale fuscous; 3rd segment about as long as 2nd, whitish with 3 oblique blackish rings, 1st ring at base, 2nd broad, beyond middle, 3rd at 3/4 in female. Thorax blackish except whitish lateral sides; tegula pale brownish gray irrorated with whitish, extreme base blackish. Legs blackish scattered with white; fore tibia with 2 narrow whitish rings, 1st at base, 2nd at middle; fore tarsus with whitish basal and apical rings on 1st segment, 2nd segment with apical narrow whitish ring; mid tibia suffused with whitish scales on about basal 1/3, with median narrow whitish ring; mid tarsus with whitish apical ring on each segment; hind tibia suffused dorsally with whitish hairs, with 3 whitish rings at base, middle and apex; hind tarsus with whitish apical ring on each segment. Forewing elongate; R_{4+5} and M_1 stalked; ground color whitish, irregularly tinged with fuscous, scattered with blackish scales; dorsal 1/3 irregularly suffused with fuscous, scattered with blackish scales; a subcostal blackish dot at near base; costa with 2 small blackish marks beyond basal 1/7; a large trapezoidal blackish mark occupying median 1/4 of costa and reaching beyond middle; 2 small blackish marks on costa at 4/7



Figs 17–18. Pregenital abdomen and genitalia of *Anarsia* spp. 17. *A. isogona* Meyrick. 18. *A. incerta* sp. n., paratype (A : 8th abdominal sternite of male. B : aedeagus. C : whole genitalia, aedeagus removed. D : female genitalia).

and 5/7 ; several obscure fuscous dots on costa beyond 5/7 to apex ; narrow subcostal fuscous line just beneath fuscous costal dots from 5/7 to apex, scattered with blackish scales ; a fuscous ovate mark in disc at 4/7 ; a round fuscous mark toward dorsum at 5/7, spotted middle with white scales ; a fuscous mark at apical 1/7, marginated above with a blackish bar ; cilia brownish gray irrorated with fuscous and whitish. Hindwing brownish gray, hyaline on basal half ; veins darker than ground color ; cilia brownish gray. Abdomen pale brownish gray above, whitish beneath.

Male genitalia. Eighth sternite with posterior margin slightly concave. Uncus digitate. Socius produced posterolaterally into a large semicircular lobe. Tegumen longer than valva, slightly tapered posteriorly. Valva asymmetrical; left valva broad, with rounded distal margin; ventral margin with a slender, strongly curved process at base, basal 1/4 rather stout; apical half bearing numerous modified scales with rather short stalk; right valva rather slenderer than left valva; ventral margin with a weakly sclerotized short process at base; apical half bearing numerous modified scales with rather short stalk. Juxta with short lobe with minute setae. Aedeagus slender; coecum thorn-like, curved posteroventrally.

Female genitalia. Apophysis posterioris about 3 times length of apophysis anterioris. Eighth tergite with anterior margin produced anteriorly into a trapezoidal plate on median 1/4 whose margin recurved inwardly to form a sclerotized pouch. Eighth sternite with anterior margin produced anteriorly into a membranous pouch; posterior margin of 8th sternite produced posteriorly into a triangular plate, reniform ostium opening just beneath this plate. Antrum funnel-shaped. Ductus seminalis arising from junction of short ductus bursae and corpus bursae. Signum small, of a sclerotized median ridge.

Material examined. Holotype: ♂, Japan, Ryukyus, Okinawa Pref., Kunigami Vill., Yona, 8. IV. 1996, T. Ueda, OPU. Paratypes: RYUKYUS: 1 ♂, Oku, Okinawa Pref., 23. IV. 1978, T. Tsukasaki, OPU; 1 ♂ 1 ♀, Benoki Riv., Okinawa Pref., 9. IV. 1996, T. Ueda, OPU; 4 ♂ 3 ♀, Yona, Okinawa Pref., 18–21. X. 1973, M. Owada, OPU; 4 ♂ 9 ♀, same locality, 8. IV. 1996, T. Ueda, OPU; 2 ♂ 9 ♀, same locality, 11. IV. 1996, T. Ueda, OPU; 1 ♂ 1 ♀, same locality, 12. IV. 1996, T. Ueda, OPU; 10 ♂ 4 ♀, Hiji Riv., Okinawa Pref., 12. IV. 1996, T. Ueda, OPU; 12 ♂ 2 ♀, Mt Tanodake, Okinawa Pref., 7. IV. 1996, T. Ueda, OPU; 1 ♂, Mt Omotodake, Ishigaki I., 2. IV. 1980, K. Yasuda, OPU.

Distribution. Japan (Ryukyus).

Biology. Host plant and early stages unknown.

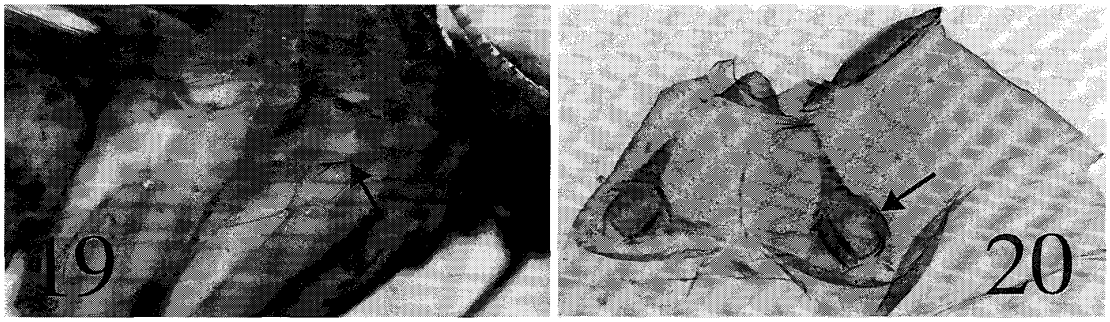
Remarks. *A. incerta* sp. n. is closest to *A. isogona* but is clearly separated by the genitalia of both sexes. Externally *incerta* sp. n. is barely distinguished by the whitish ground color from brownish gray ground color of *isogona*. In the male, *incerta* sp. n. is distinguished by the valva with rounded distal margin, the strongly curved process on the ventral margin of the left valva and the presence of the short process on the ventral margin of the right valva; in the female, by the anterior margin of 8th tergite produced anteriorly into a trapezoidal plate at middle of which margin recurved inwardly to form a sclerotized pouch and the presence of the signum. In *isogona*, the valva is broad in basal 3/5 and abruptly tapered to narrow on apical 2/5, the process on the ventral margin of the left valva is evenly curved and the ventral margin of the right valva is smooth without any process; in the female the anterior margin of the 8th tergite is almost straight, the 8th tergite is armed with a triangular sclerite at middle on the ventral surface and the signum is absent.

Group B

Anarsia bipinnata (Meyrick) (Figs 3, 12, 19, 20, 21)

Chelaria bipinnata Meyrick, 1932, *Exot. Microlepid.* **4**: 200; Gaede, 1937, *in* Bryk, *Lepid. Cat.* **79**: 409; Clarke, 1969, *Cat. Type Specimens Microlepid. Br. Mus. nat. Hist. descr. E. Meyrick* **6**: 409, pl. 203, fig. 2.

Anarsia bipinnata: Issiki, 1950, *Icon. Ins. Japon.* (2nd edn): 467, fig. 1264; Inoue, 1954, *Check List*



Figs 19–20. *A. bipinnata* (Meyrick). 19. Male thorax in the right view (arrow indicates the hair pencils of the mesothoracic anepisternum). 20. Female 7th abdominal segment (arrow indicates the pleural pit).

Lepid. Japan **1**: 69; Issiki, 1957, *Icon. Heteroc. Japon. Col. Nat.* **1**: 43, pl. 6, fig. 184; Okano, 1959, *Icon. Ins. Japon. Col. nat.* **1**: 270, pl. 179, fig. 28; Amsel, 1967, *Beitr. naturk. Forsch. SüdwDtl.* **26**: 25, figs 15, 19; Issiki, 1971, *Icon. Heteroc. Japon. Col. Nat.* (2nd edn) **1**: 43, pl. 6, fig. 184; Moriuti, 1982, *Moths Japan* **1**: 282, **2**: pl. 13, fig. 22; Park, 1991, *Jap. J. Ent.* **59**: 492, figs 1, 6, 8–11.
Anarsia bipinata [!]: Park, 1983, *Illust. Flora & Fauna Korea* **27**: 498, fig. 159, pl. 33, fig. 567.

Forewing length: ♂, 7.1–8.4 mm (7.76±0.34 mm on average±S.D. of 29 specimens); ♀, 6.5–8.3 mm (7.58±0.41 mm on average±S.D. of 24 specimens).

Material examined. HOKKAIDO: 1 ♀, Nopporo, Ebetu City, 7. VII. 1992, Y. Sakamaki, HU; 1 ♂, Kikonai Town, 10. VIII. 1976, T. Kumata *et al.*, HU. HONSHU: 1 ♂, Utsukushigahara, Nagano Pref., 25–26. VII. 1955, A. Mutuura, OPU; 1 ♀, Shimashimadani, Nagano Pref., 3. VIII. 1991, N. Hirano, OPU; 1 ♂ 1 ♀, Kisojihara, Nagano Pref., 30–31. VII. 1992, T. Hirowatari, OPU; 1 ♂, same locality, 7. VII. 1995, T. Hirowatari, OPU; 1 ♀, Oshirakawa, Nagano Pref., 21. VII. 1994, T. Ueda, OPU; 10 ♂, Takayama, Gifu Pref., 22–25. VII. 1954, A. Mutuura, OPU; 2 ♂ 1 ♀, Mt Nekogatake, Ishikawa Pref., 8. VII. 1993, T. Ueda, OPU; 2 ♂, Kitayama, Ishikawa Pref., 7. VII. 1993, T. Ueda, OPU; 1 ♂ 1 ♀, Tochidani, Nara Pref., 24. VII. 1991, T. Ueda, OPU; 1 ♂, Mt Wasamatayama, Nara Pref., 18. VIII. 1988, T. Yasuda & Y. S. Bae, OPU; 2 ♂, same locality, 23–24. VII. 1991, T. Ueda, OPU; 1 ♂, same locality, same date, T. Hirowatari, OPU; 1 ♂, Mt Myokensan, Osaka Pref., 9. VI. 1951, A. Mutuura, OPU; 1 ♂ 1 ♀, Sakai, Osaka Pref., 22. V. 1953, A. Mutuura, OPU; 1 ♂ 4 ♀, Mt Izumikatsuragisan, Osaka Pref., larvae 15. V. 1993 *ex Elaeagnus multiflora* em. 24–31. V. 1993, T. Ueda, OPU; 8 ♀, same locality, larvae 22–25. V. 1996 *ex Elaeagnus multiflora* em. 29. V.–2. VI. 1996, T. Ueda, OPU; 1 ♀, Mt Kongosan, Osaka Pref., 29. VI. 1960, M. Okada, OPU; 1 ♀, Mt Mikusayama, Hyogo Pref., 27. VI. 1991, T. Ueda, OPU.

Distribution. Japan (Hokkaido, Honshu), Korea.

Biology. Host plants: *Elaeagnus multiflora* Thunb. and *E. umbellata* Thunb. (Elaeagnaceae), *Acer ginnala* Max. (Aceraceae) and *Quercus* sp. (Fagaceae).

The reddish brown larvae are observed in early summer between spun leaves of *Elaeagnus* spp. (Moriuti, 1982). The larvae are observed in late May at Osaka. *Acer ginnala* and *Quercus* sp. are recorded as the host plants by Park (1991). The adults occur in late June to early August.

Remarks. The detail redescription of the species was given by Park (1991) along with

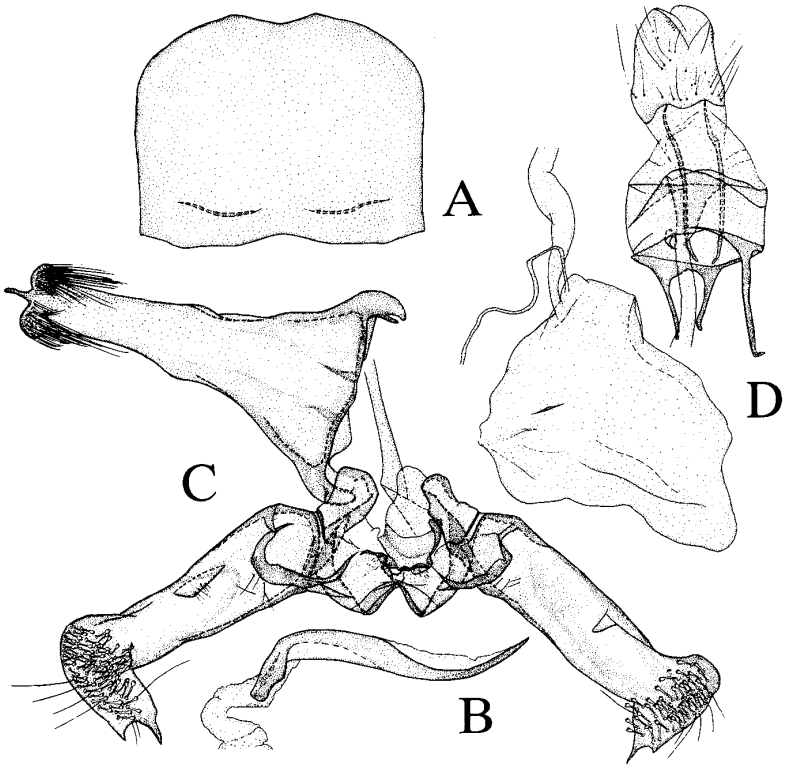


Fig. 21. Pregenital abdomen and genitalia of *A. bipinnata* (Meyrick) (A : 8th abdominal sternite of male. B : aedeagus. C : whole genitalia, aedeagus removed. D : female genitalia).

illustrations of the genitalia. Three unique characters are found in this species, *viz*., the whitish hair pencils beneath base of cell on the undersurface of the male forewing, the long yellowish white hair pencils of the male mesothoracic anepisternum (Fig. 19) and a pair of the pleural pits in the anterior margin of the female 7th abdominal segment (Fig. 20). In the male, this species and *A. protensa* have the 8th sternite whose anterior margin is concave at middle.

A. bipinnata is superficially similar to *A. bimaculata* but is easily distinguished form it by the absence of blackish plical streak in the forewing. *A. bipinnata* is closest to *A. aspera* Park, 1995 judging from the male genitalia, but is clearly separated from it by the much larger size and the blackish discal mark in the forewing (Park, 1995). The hair pencils of the male mesothoracic anepisternum indicate that the species is closely related to *A. protensa* and the character is considered as a synapomorphy of these species. However, the species is easily distinguished from *protensa* by the 2 blackish marks occupying middle of costa and cell in the forewing, the inflated apical 1/4 of the valva which is produced ventrally into an acute process in the male genitalia and by the presence of a long rod-like process on the anterior margin of the 8th sternite in the female genitalia.

Anarsia protensa Park (Figs 4, 13, 22)

Anarsia protensa Park, 1995, *Trop. Lepid*. **6** : 60, figs 13, 14, 43, partim.

Forewing length : ♂, 6.0–7.5 mm (6.60±0.38 mm on average±S.D. of 21 specimens) ; ♀, 6.0–7.1 mm (6.63±0.27 mm on average±S.D. of 13 specimens).

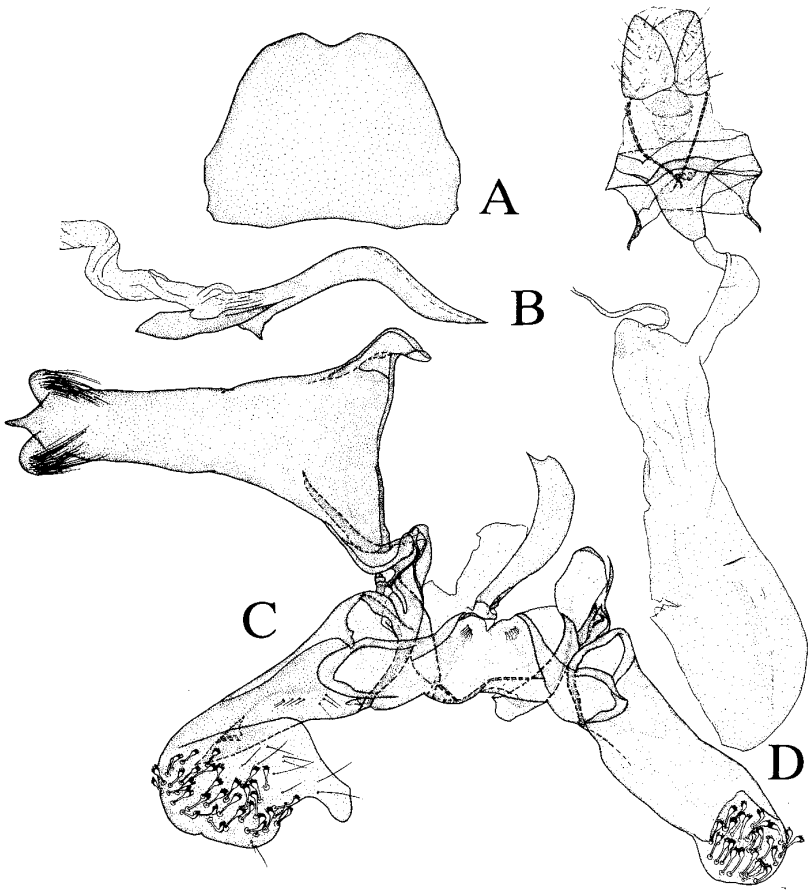


Fig. 22. Pregenital abdomen and genitalia of *A. protensa* Park (A : 8th abdominal sternite of male. B : aedeagus. C : whole genitalia, aedeagus removed. D : female genitalia).

Female genitalia. Apophysis posterioris about 3 times length of apophysis anterioris. Eighth tergite with anterior margin deeply concave ; a small triangular sclerite at middle on ventral surface. Ostium opening anteriorly beyond middle. Antrum large funnel-shaped. Ductus seminalis arising from left posterior corner of corpus bursae. Corpus bursae oblong. Signum ill-defined, of a narrow ridge.

Material examined. HONSHU : 1 ♀, Sensaka-toge, Aichi Pref., 21. V. 1992, T. Mano, OPU ; 1 ♀, Sonenji, Osaka Pref., 19. V. 1993, T. Ueda, OPU ; 7 ♂, Mt Makiosan, Osaka Pref., 18. VI. 1981, T. Sato, OPU ; 1 ♂, Mt Iwawakisan, Osaka Pref., 25. V. 1951, A. Mutuura, OPU ; 1 ♂, same locality, 25. VII. 1952, T. Kodama, OPU ; 1 ♀, Myooji, Wakayama Pref., larvae 24. III. 1994 *ex Elaeagnus pungens* em. 16. IV. 1994, M. Murase, OPU ; 1 ♀, same locality, larvae 26. III. 1995 *ex Elaeagnus pungens* em. 19. IV. 1995, M. Murase, OPU ; 16 ♂ 5 ♀, same locality, larvae 24. III. 1996 *ex Elaeagnus pungens* em. 7–19. IV. 1996, T. Ueda, OPU ; 1 ♀, Kii-Oshima, Wakayama Pref., 6–8. V. 1989, T. Hirowatari & J. D. Liu, OPU ; 1 ♀, Nuno, Hiroshima Pref., 29. V. 1992, Y. Yamate, OPU ; 1 ♀, same locality, 27. V. 1993, Y. Yamate, OPU ; 1 ♀, same locality, 5. IX. 1993, Y. Yamate, OPU. KYUSHU : 1 ♂, Mt Hikosan, Fukuoka Pref., 23. IX. 1950, H. Kuroko, OPU.

Distribution. Japan (Honshu, Kyushu) (new record), Taiwan.

Biology. Host plant : *Elaeagnus pungens* Thunb. (Elaeagnaceae).

The reddish brown mature larvae boring the fruits of the host plant were collected in late March at Wakayama City by Mrs Murase and me. In the field, we could not clarify the site for pupation, but in the breeding case in the laboratory the larvae moved out from the fruit of the host plant and pupated between tissue papers.

Remarks. *A. protensa* is externally similar to *A. isogona*, but the genitalia and the hair pencils of mesothoracic anepisternum in the male indicate that the species is closely related to *A. bipinnata*. *A. protensa* is easily distinguished from *A. isogona* by the much larger body size and by the hair pencils of mesothoracic anepisternum in the male. *A. protensa* is also separated from *isogona* by the genitalia of both sexes.

As a result of dissecting Japanese specimens of *protensa* reared from *Elaeagnus pungens*, I found that the female genitalia of *protensa* shown by Park (1995) were based on a misidentified specimen. He described and figured the female genitalia of *protensa* based on only one specimen, and commented that the genitalia are similar to those of *isogona*. However, judging from his original description, I concluded that the female paratype specimen of *protensa* is conspecific with *isogona*.

Group C

Anarsia bimaculata Ponomarenko (Figs 5, 8, 14, 23)

Anarsia bimaculata Ponomarenko, 1989, *Ent. Obozr.* 68 : 635, figs 18–21 ; Park, 1991, *Jap. J. Ent.* **59** : 496, figs 3, 16–18.Forewing length : ♂, 6.5–7.2 mm (6.93±0.21 mm on average± S.D. of 15 specimens) ; ♀, 6.6–7.4 mm (6.99±0.30 mm on average±S.D. of 7 specimens).

Head whitish gray irrorated with pale brownish gray. Antenna pale brownish gray mixed with whitish gray, with fuscous annulations ; scape pale brownish gray irrorated with whitish gray. Labial palpus with dense subtriangular scale tuft on under surface of 2nd segment ; 2nd segment blackish mixed with ocherous, apical 1/5 whitish irrorated with black ; 3rd segment about as long as 2nd, basal half whitish with an oblique blackish ring at base, apical half blackish except whitish apex in female. Thorax whitish gray heavily irrorated with fuscous ; tegula pale brownish gray irrorated with whitish. Legs blackish scattered with white ; fore tibia with 2 narrow whitish rings, 1st at middle, 2nd at apex ; mid tibia suffused with whitish scales near base ; hind tibia suffused dorsally with whitish hairs ; fore, mid and hind tarsi with a whitish apical ring on each segment. Forewing elongate with ocherous hair pencils beneath base of cell on undersurface in male ; ground color whitish gray, irregularly suffused with pale fuscous, scattered with blackish scales ; costa with a blackish dot at base ; a subcostal blackish dot at near base ; 5 fuscous marks on costa, 1st and 2nd narrow, oblique outwardly at before basal 1/3, 3rd elongate from 1/3 to 5/9, 4th at about 2/3, 5th narrow, oblique outwardly at 7/9 and extended by an irregular streak of pale fuscous irroration round apex and termen which is cut by several fuscous dots ; a fuscous streak in disc from 1/3 to 5/9 ; a fuscous streak along fold from 1/3 to tornus, cut by whitish gray from 4/9 to 5/9 ; cilia brownish gray irrorated with whitish gray. Hindwing brownish gray with broadly expanded costal margin from base to beyond middle ; cilia brownish gray. Abdomen brownish gray above, whitish beneath.

Male genitalia. Eighth sternite slightly tapered posteriorly, with posterior margin distinctly concave at middle. Uncus with a long acute process. Tegumen almost equal length of valva, narrow, slightly tapered posteriorly. Valva asymmetrical ; left valva broad, ovate ; ventral

margin with a long, slender process which is strongly curved dorsally ; distal portion bearing numerous modified scales with rather short stalk ; right valva narrow, slightly curved ventrally, narrowest at middle ; dorso-distal corner angled ; ventral margin produced ventrally into a subtriangular plate from 2/3 to near distal end ; a narrow, anteriorly curved process on ventral margin at 2/3 ; distal margin rounded ; distal portion bearing numerous modified scales with rather short stalk. Juxta with short lobe with minute setae. Saccus digitate. Aedeagus slender, with inflated basal half ; apical 1/6 curved ventrally ; ventral base with a small keel.

Female genitalia. Apophysis posterioris about 8 times length of very short apophysis anterioris. Eighth tergite with anterior margin deeply concave and produced anteriorly into a broad trapezoidal plate on median half, whose anterior portion set with a pair of subtriangular plates ; a sagittate sclerite at middle, whose anterior margin recurved to form sclerotized pouch. Ostium opening at center of 8th sternite, narrow rhomboid shape. Antrum subtriangular. Ductus seminalis arising from right posterior end of oblong corpus bursae.

Material examined. HOKKAIDO : 1 ♂, Takinoshita, Kuriyama Town, 19. VII. 1995, K. Sugisima, HU ; 1 ♀, Nopporo, Ebetsu City, 18. VIII. 1992, Y. Sakamaki, HU ; 1 ♂ 1 ♀, Misumai, Sapporo City, 27. VII. 1992, Y. Sakamaki, HU ; 7 ♂ 4 ♀, Moiwa Dam, Sapporo City, 28. VII. 1993, T. Ueda, OPU. HONSHU ; 1 ♂, Kisojihara, Nagano Pref., 30–31. VII. 1992, T. Hirowatari, OPU ; 1 ♂, same locality, 21. VII. 1994, T. Ueda, OPU ; 1 ♂, Takayama, Gifu Pref., 24. VII. 1954, A. Mutuura, OPU ; 3 ♂ 3 ♀, Mt Nekogatake, Ishikawa Pref., 8. VII. 1993, T. Ueda, OPU.

Distribution. Japan (Hokkaido, Honshu) (new record), Russia, Korea.

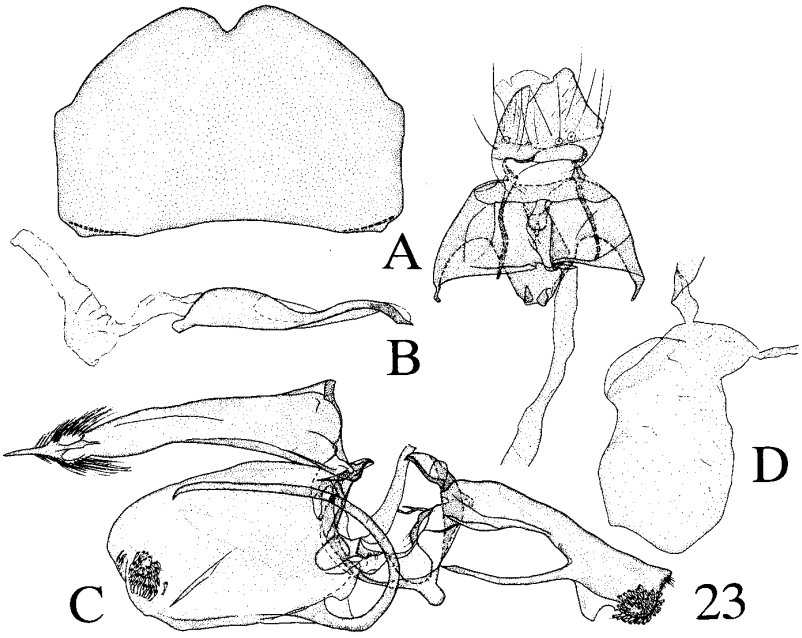
Biology. Host plant and early stages unknown.

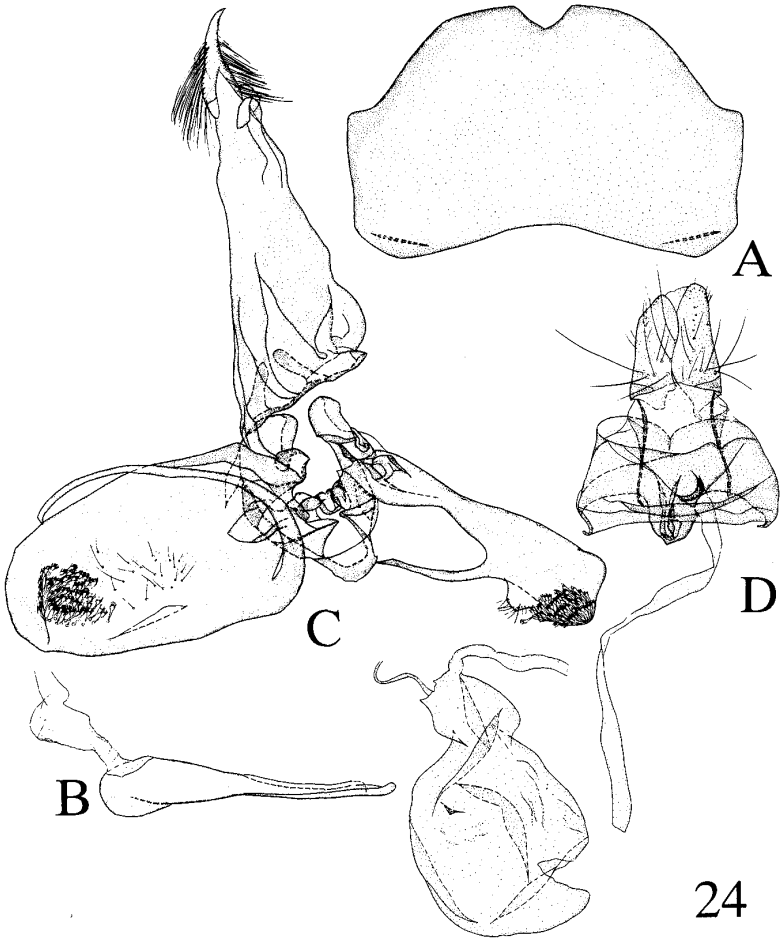
Remarks. Superficially *A. bimaculata* is separated from all the other Japanese *Anarsia* species by the whitish gray color of the forewing which is irregularly suffused with pale fuscous and the presence of a fuscous streak along fold from basal 1/3 to tornus in the forewing which is cut by whitish gray from 4/9 to 5/9. The male genitalia indicate that the species is closely related to *A. halimodendri* Christoph, 1877 and *A. nigricana* Park, 1991. It is, however, distinguished from the former by the inflated distal angle of the costa of the right valva (Ponomarenko, 1989) and from the latter by the long process of the left valva arising from ventro-basally. The male genitalia also indicate that the species is closely related to *A. silvosa* sp. n. and the distinguishing characters between them are mentioned under *silvosa* sp. n. *A. bimaculata* is recorded from Japan for the first time.

***Anarsia silvosa* sp. n.** (Figs 6, 15, 24)

Forewing length : ♂, 6.6–7.5 mm (7.20±0.27 mm on average±S.D. of 12 specimens) ; ♀, 7.35 mm.

Head whitish gray heavily irrorated with pale brownish gray. Antenna whitish gray mixed with pale brownish gray, with fuscous annulations ; scape fuscous irrorated with whitish gray. Labial palpus with dense subtrapezoidal scale tuft on under surface of 2nd segment ; 2nd segment fuscous mixed with ocherous, with whitish irroration on apical margin ; 3rd segment about as long as 2nd, whitish with 2 blackish rings, 1st narrow at base, 2nd broad from basal 1/3 to 2/3 in female. Thorax whitish gray irrorated with pale brownish gray ; each lateral side with 2 blackish spots at anterior 1/3 and near posterior end ; tegula pale brownish gray scattered with whitish gray. Legs blackish scattered with whitish gray ; fore tibia with 2 narrow whitish gray rings, 1st at middle, 2nd at apex ; fore tarsus with whitish





Figs 23–24. Pregenital abdomen and genitalia of *Anarsia* spp. 23. *A. bimaculata* Ponomarenko. 24. *A. silvosa* sp. n., paratype (A : 8th abdominal sternite of male. B : aedeagus. C : whole genitalia, aedeagus removed. D : female genitalia).

gray apical ring on each segment; mid tibia clothed with rough scales on basal half, with apical whitish gray ring; mid tarsus with a yellowish white apical ring on each segment; hind tibia suffused dorsally with yellowish white hairs; hind tarsus with 1st segment suffused dorsally with yellowish white, with yellowish white ring at apex; apical 4 segments yellowish white apical ring on each segment. Forewing elongate with pale brownish gray hair pencils beneath base of cell on undersurface in male; ground color whitish gray, scattered with pale brownish gray and blackish scales; costa with a blackish suffusion at base; a subcostal blackish dot at basal 1/9; a blackish short bar beneath fold at 2/9; a trapezoidal fuscous suffusion occupying from 1/9 to 2/3, reaching dorsum; a roughly projected blotch of blackish scales at middle, placed on subtrapezoidal fuscous suffusion; a crescent-shaped fuscous mark at 2/3; apical 2/9 irregularly suffused with fuscous; several blackish dots on costa from apical 2/9 to apex; cilia brownish gray irrorated with whitish gray. Hindwing brownish gray scattered with fuscous with broadly expanded costal margin from base to beyond middle; cilia brownish gray. Abdomen brownish gray above, whitish beneath, with ocherous anal tuft in male.

Male genitalia. Eighth sternite with posterior margin distinctly concave at middle. Uncus broad at base, tapered to pointed hook-shaped apex. Tegumen longer than valva, narrow, tapered posteriorly. Valva asymmetrical; left valva broad, ovate; ventral margin with a long process as in *bimaculata*; central portion of distal 1/4 bearing numerous modified scales with rather short stalk; right valva as in *bimaculata*, narrowest at before middle; dorso-distal corner rounded. Juxta with short lobe with minute setae. Saccus broad, short. Aedeagus almost straight, slender, tapered to rounded apex; ventral base with a semicircular keel.

Female genitalia. Apophysis posterioris about 8 times length of very short apophysis anterioris. Eighth tergite produced anteriorly into a broad tongue-shaped plate on median 1/3 whose ventral surface armed with a pair of narrow longitudinal long plates from beyond middle to near anterior end. Eighth sternite with shallow, broadly triangular groove, ostium opening anterior end of triangular groove. Antrum narrow ring. Ductus bursae long. Ductus seminalis arising from left posterior end of corpus bursae. Corpus bursae oval, constricted at posterior 1/5. Signum small, triangular ridge.

Material examined. Holotype: ♂, Japan, Honshu, Oita Pref., Shonai Town, Shiramizu, 27-28. VII. 1995, T. Ueda, OPU. Paratypes: HONSHU: 2 ♂, Shimashimadani, Nagano Pref., 30. VII. 1986, N. Hirano, OPU; 1 ♂, same locality, 28. VIII. 1990, N. Hirano, OPU; 5 ♂, same locality, 28. VIII. 1991, N. Hirano, OPU; 1 ♀, same locality, 25. VIII. 1993, N. Hirano, OPU; 1 ♂, Gofukuji, Nagano Pref., 21. VIII. 1953, A. Mutuura, OPU. KYUSHU: 2 ♂, Shiramizu, Oita Pref., 27-28. VII. 1995, T. Ueda, OPU.

Distribution. Japan (Honshu, Kyushu).

Biology. Host plant and early stages unknown.

Remarks. *A. silvosa* sp. n. is easily recognized by the whitish gray color and a roughly projected blotch of blackish scales at middle in the forewing. Judging from the male genitalia, *A. silvosa* sp. n. is closely related to *A. halimodendri* Christoph and *A. bimaculata* Ponomarenko, but separated from the former by the position of ostium in the female genitalia and from the latter by the almost straight aedeagus with a large semicircular keel at ventral base. The male genitalia indicate that *A. silvosa* sp. n. is closest to *A. nigricana* Park, but separated by the almost straight and tapered aedeagus and by the long process of the left valva arising from ventral base.

Group D

Anarsia tortuosa (Meyrick), **comb. n.** (Figs 7a, 7b, 16, 25)

Chelaria tortuosa Meyrick, 1913, *J. Bombay nat. Hist. Soc.* **22**: 164; Meyrick, 1925, *in* Wytsman, *Genera Insect.* **184**: 156; Gaede, 1937, *in* Bryk, *Lepid. Cat.* **79**: 415; Clarke, 1969, *Cat. Type Specimens Microlepid. Br. Mus. nat. Hist. descr. E. Meyrick* **6**: 430, pl. 214, fig. 4.

Forewing length: ♂, 4.8–5.6 mm (5.27±0.27 mm on average±S.D. of 7 specimens); ♀, 5.3–5.4 mm.

Head pale grayish brown irrorated with ocherous, with a longitudinal dark grayish brown streak at middle. Antenna fuscous, with blackish annulations; scape dark brown. Labial palpus with dense subtrapezoidal scale tuft on under surface of 2nd segment; 2nd segment fuscous, with a ocherous stripes scattered with fuscous at base and also at apex; 3rd segment slightly shorter than 2nd segment, basal 1/3 ocherous with narrow, oblique fuscous ring at base, apical 2/3 fuscous except ocherous apex in female. Thorax grayish brown irrorated with fuscous, with faint, longitudinal fuscous streak at middle; lateral sides tinged with fuscous; tegula grayish brown scattered with fuscous. Legs fuscous scattered with ocherous; fore tibia with 2 narrow ocherous rings, 1st at middle, 2nd at apex; fore tarsus with a ocherous apical ring on each segment; mid tibia with 2 narrow brownish rings, 1st at middle, 2nd at apex; mid tarsus with brownish apical ring on each segment; hind tibia suffused dorsally with yellowish white hairs on basal half, apical half yellowish white dorsally mixed with fuscous; hind tarsus with basal segment yellowish white dorsally, irrorated with fuscous except at yellowish white apex; apical 4 segments with yellowish white ring on apex of each segment. Forewing elongate, with blackish hair pencils beneath base of cell on undersurface in male; ground color grayish brown scattered with whitish and fuscous; costal 1/3 irregularly suffused with ocherous; a narrow, oblique fuscous mark at 2/7 on costa; costa with a subtriangular fuscous suffusion from before middle to 3/4; streak of dark fuscous suffusion along fold throughout; cilia brownish gray scattered with fuscous and whitish. Hindwing brownish gray, hyaline on basal 2/3 with broadly expanded costal margin from base to middle; a blackish hair pencils at base of cell in male; veins darker than ground color; cilia brownish gray.

Male genitalia. Eighth sternite strongly tapered posteriorly from anterior 1/3, with posterior margin deeply concave. Uncus trapezoidal, set with dense long hairs on dorsolateral surface; distal margin with a short, acute median process. Tegumen nearly equal length of valva, slightly tapered posteriorly; subtrapezoidal plate at posterior end of each lateral side. Valva asymmetrical; left valva rather broad, abruptly tapered to digitate apical 1/7; ventral margin with a strongly hooked process at base; apical 1/7 bearing numerous modified scales with short stalk; right valva slender, tapered; ventral margin sinuate, with 2 lobes, 1st triangular at base, 2nd slender, slightly acute at 5/6; apical 1/6 bearing numerous modified scales with short stalk. Aedeagus slender, S-shaped, coiled one time at beyond middle.

Female genitalia. Apophysis posterioris rather long. Apophysis anterioris absent. Eighth tergite broadly expanded anteriorly to form a trapezoidal plate; anterior margin marginated with sclerite and produced anteriorly into triangular plate at middle. Eighth sternite with anterior margin produced anteriorly into an oval membranous pouch; posterior margin concave; a narrow crescent sclerite beneath anterior margin at middle, ostium opening beneath this sclerite. Ductus bursae rather long, with weakly sclerotized median 1/3; ductus seminalis arising from anterior end of weakly sclerotized portion. Corpus bursae

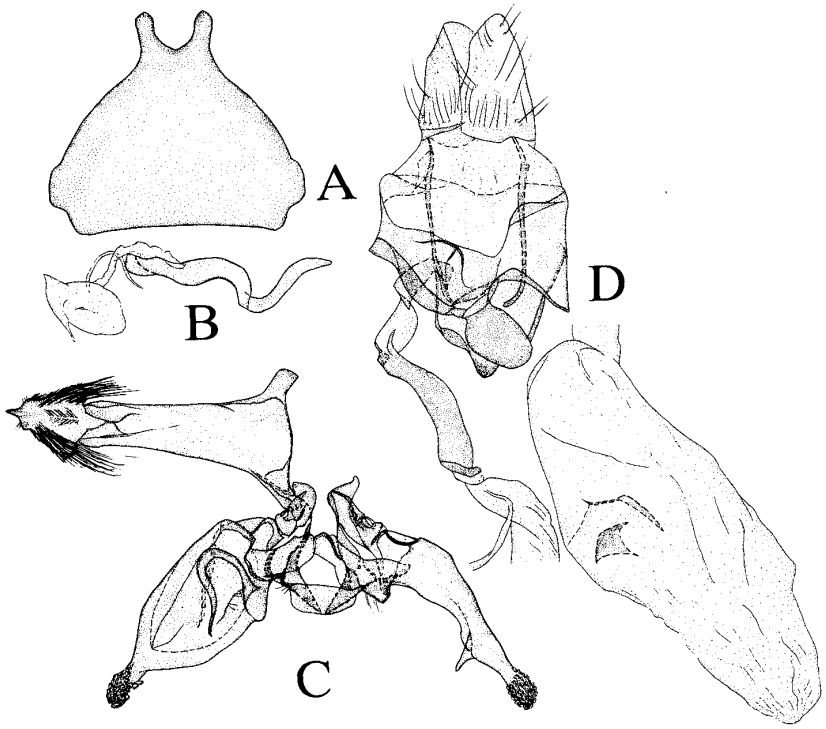


Fig. 25. Pregenital abdomen and genitalia of *A. tortuosa* (Meyrick) (A : 8th abdominal sternite of male. B : aedeagus. C : whole genitalia, aedeagus removed. D : female genitalia).

oblong, with narrow curved sclerite at middle. Signum large, of a fan-shaped ridge.

Material examined. RYUKYUS : 1 ♀, Mt Omotodake, Ishigaki I., 2. IV. 1980, I. Kanazawa, OMNH ; 1 ♀, Funaura, Iriomote I., 14. X. 1992, T. Ueda, OPU ; 2 ♂, same locality, 10. V. 1993, Y. Nakatani, OPU ; 5 ♂, Kuura Riv., Iriomote I., 28. XI. 1996, T. Ueda, OPU.

Distribution. Japan (Ryukyus) (new record), Sri Lanka.

Biology. Host plant and early stages unknown.

Remarks. This species was originally described upon a single female specimen from Sri Lanka, and there has been no subsequent record in literature and its generic position has not been reviewed in the modern sense of systematics. The Ryukyus specimens including the male were safely identified as *tortuosa* through the comparison with the holotype specimen (Fig. 7b) deposited in the Natural History Museum, London and with Clarke's (1969) figure of the female genitalia, which are very characteristic in the lack of the apophysis anterioris and the large fan-shaped signum, and the males show that this species is apparently a member of *Anarsia* in all respects. In the male genitalia, *A. tortuosa* resembles *A. reciproca* Meyrick, 1920 from South India and *A. ulmarata* Bradley, 1961 from Solomon, but it is readily separated from them by the strongly hooked process of the left valva, the presence of the 2 lobes of the right valva and the coiled aedeagus. Among these species, *tortuosa* is characterized and easily recognized by the possession of blackish hair pencils of the forewing and the hindwing in the male. In the Japanese members of *Anarsia*, this species is immediately identified by the brownish color of the forewing and by the trapezoidal uncus and the coiled aedeagus in the male genitalia and the lack of the apophysis anterioris and the large fan-shaped signum in the female genitalia.

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References

Amsel, H. G., 1967. Die afghanischen Arten des *Anarsia*-Komplexes. Zugleich eine vorläufige Revision der sonstigen paläarktischen Arten (Lepidoptera: Gelechiidae). *Beitr. naturk. Forsch. SüdwDtl.* **26**: 17–31.

Clarke, J. F. G., 1969. *Catalogue of the Type Specimens of Microlepidoptera in the British Museum (Natural History) described by Edward Meyrick* **6**. 537 pp., 267 pls. Trustees of the British Museum (Natural History), London.

Klots, A. B., 1970. Lepidoptera. *In* Tuxen, S. L., *Taxonomist's Glossary of Genitalia in Insects* (2nd edn): 115–130. Munksgaard, Copenhagen.

Kuzunetzov, V. I. & A. A. Stekolnikov, 1984. Classification and phylogenetic relationships of the families and superfamilies of the gelechioid moths (Lepidoptera, Papilionomorpha: Copromorphoidea, Elachistoidea, Coleophoroidea, Gelechioidea) with regard of functional morphology of the male genitalia. *Trudy zool. Inst. Leningr.* **122**: 3–68 (in Russian).

Meyrick, E., 1939. New Microlepidoptera, with notes on others. *Trans. R. ent. Soc. Lond.* **89**: 47–62.

Moriuti, S., 1982. Gelechiidae. *In* Inoue, H., *et al., Moths of Japan* **1**: 275–288, **2**: 212–215, pls 227, 233, 242–244, 257–260. Kodansha, Tokyo. (In Japanese).

Park, K. T., 1991. Korean species of the genus *Anarsia* (Lepidoptera, Gelechiidae). *Jap. J. Ent.* **59**: 490–498.

————, 1995. Gelechiidae of Taiwan. I. Review of *Anarsia*, with descriptions of four new species (Lepidoptera: Gelechioidea). *Trop. Lepid.* **6**: 55–66.

Pitkin, L. M. & Sattler, K., 1991. *Sattleria*: a European genus of brachypterous alpine moths (Lepidoptera: Gelechiidae). *Bull. Br. Mus. nat. Hist.* (Ent.) **60**: 205–241.

Ponomarenko, M. G., 1989. A review of moths of the genus *Anarsia* Z. (Lepidoptera, Gelechiidae) of the fauna of the USSR. *Ent. Obozr.* **68**: 628–641 (in Russian). [Translated into English in *Ent. Rev. Wash.* **69**: 102–117, 1990].

Réal, P., 1994. Contribution à la connaissance des *Anarsia* de France et de pays limitrophes. *Mém. Comité Liaison Rech. ecofaun. Jura* **12**: 126 pp.

摘　　要

日本産 *Anarsia* 属の分類学的再検討（鱗翅目，キバガ科）（上田達也）

日本からは *Anarsia* 属に含まれる種として *A. bipinnata* (Meyrick) と *A. isogona* Meyrick の 2 種が知られていた．今回日本産 *Anarsia* 属の分類学的再検討を行った結果，上記 2 種以外に 2 新種 *A. incerta* sp. n., *A. silvosa* sp. n.，日本新記録種 *A. protensa* Park, *A. bimaculata* Ponomarenko, *A. tortuosa* (Meyrick) (新結合) の計 7 種が日本に産することが判明した．また *A. protensa* をナワシログミの果実より採集・飼育した結果，Park (1995) による雌の記載は誤同定された *A. isogona* の標本に基づいたものであることが判明した．*Anarsia* 属の単系統性は，雄下唇鬚第 3 節の著しい縮小，雄交尾器の gnathos の消失，雄交尾器の valva 先端の特殊な鱗片の存在，の 3 つの共有派生形質によって支持された．ま

た日本産 *Anarsia* 属を暫定的に 4 種群に分割した．Group A と B において半円形の socius が存在し，Group B, C, D に雄前翅裏面に毛束が存在するが，これらの形質のどちらが真の共有派生形質であるかは決定できなかった．以下各種群を特徴付ける派生形質と，そこに含まれる種の分布と特徴を記す．

Group A：雄交尾器の aedeagus に腹部前方に強く曲がる coecum が存在する．

A. isogona Meyrick, 1913 (Figs 1, 9, 10, 17) ヒメマエモンハイキバガ (新称)

次種および *A. protensa* に似るが雌雄交尾器により識別は容易である．また雄では前胸上前側板の毛束の有無によって *A. protensa* と区別できる．分布：日本 (本州，九州)，中国，台湾，インド．

A. incerta sp. n. (新種) (Figs 2, 11, 18) コマエモンハイキバガ (新称)

前種に近縁であるが，雄交尾器において前種の valva 先端 2/5 が著しく細くなるのに対して，本種ではならないことから識別は容易である．また雌交尾器においても第 8 腹板後縁中央に三角形のプレートが伸びる点や，signum の存在で区別できる．分布：日本 (琉球)．

Group B：雄前胸上前側板に毛束が存在する．

A. bipinnata (Meyrick) (Figs 3, 12, 19, 20, 21) フタクロモンキバガ

前翅前縁中央および中室中央に黒斑があることにより他種との識別は容易である．分布：日本 (北海道，本州)，韓国．

A. protensa Park (日本新記録) (Figs 4, 13, 22) マエモンハイキバガ (新称)

A. isogona に似るが，雄前胸上前側板に毛束が存在することで区別できる．また雌雄交尾器によっても他種との区別は容易である．分布：日本 (本州，九州)，台湾．

Group C：雄交尾器の左 valva が大きく膨らむ；雄交尾器の左 valva に長く，大きく曲がる突起が存在する；雄交尾器の右 valva に前方に曲がる突起が存在する．

A. bimaculata Ponomarenko (日本新記録) (Figs 5, 8, 14, 23) フタモンキバガ (新称)

A. bipinnata に似るが，雌雄交尾器によって識別は容易である．分布：日本 (北海道，本州)，ロシア，韓国．

A. silvosa sp. n. (新種) (Figs 6, 15, 24) モンハイジロキバガ (新称)

前翅中央に鱗粉の隆起した黒色斑があることで他種から区別できる．雄交尾器は前種に似るが aedeagus の腹面基部の竜骨状の骨片が半円形になることで識別できる．雌交尾器による前種との区別も antrum がリング状になること，signum が存在することなどで容易である．分布：日本 (本州，九州)．

Group D：雄後翅中室に毛束が存在する．

A. tortuosa (Meyrick), comb. n. (新結合，日本新記録) (Figs 7a, 7b, 16, 25) チャイロスジキバガ (新称)

琉球地域で得られた標本をイギリスの自然史博物館に保管されている完模式標本および Clarke (1969) に図示された雌交尾器と比較，検討した結果，本種であることが判明した．本種はこれまで，スリランカから得られた雌 1 個体のみしか知られておらず，*Chelaria* (＝*Hypatima*) 属に所属させられていたが，今回雄下唇鬚と雄交尾器の特徴から *Anarsia* 属に所属を初めて移した (新結合)．本種は前翅が褐色であることから日本産の他種と容易に区別できる．分布：日本 (琉球)，スリランカ．

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